

Decision Document

**Solid Waste Management Units B-11a
Building 101-31 Catchment Pit
Hawthorne Army Depot
Hawthorne, Nevada**



September 2000



Hawthorne Army
Depot



Decision Document SWMU B-11a

September 2000

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ENVIRONMENTAL PROTECTION

The selected remedy is protective of human health and the environment. It has been shown that a complete pathway to human health and the environment does not exist, and there is no potential for an exposure pathway to be completed in the future.

U. S. Army

19 SEP 2000

Anne L. Davis

Anne L. Davis
Lieutenant Colonel, U.S. Army
Commanding

State of Nevada

14 FEB 2001

Paul Liebendorfer

Paul Liebendorfer
Chief, Bureau of Federal Facilities

Decision Document

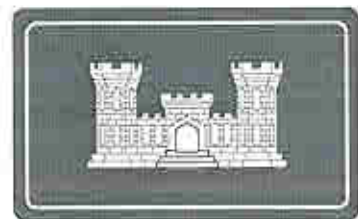
**Solid Waste Management Units B-11a
Building 101-31 Catchment Pit
Hawthorne Army Depot
Hawthorne, Nevada**



September 2000



Hawthorne Army
Depot



Decision Document
SWMU B-11a, Building 101-31 catchment Pit
Hawthorne Army Depot
Hawthorne, Nevada

1.0 Introduction:

This decision document describes the rationale for the proposed closure of SWMU B-11a, Building 101-31 catchment pit, at the Hawthorne Army Depot (HWAD), Hawthorne, Nevada. This document was prepared by the U.S. Army Corps of Engineers, Sacramento District, HWAD and the Nevada Department of Environmental Protection (NDEP).

Tetra Tech, Inc. (Tt), and Ecology and Environment (E&E) were tasked by the US Army Corps of Engineers, Sacramento District (USACE), to perform remedial investigations and ground water monitoring at the Hawthorne Army Depot (HWAD), Hawthorne, Nevada. These tasks were conducted from early 1994 through 1997, primarily at solid waste management units (SWMUs) designated by the Army and the Nevada Division of Environmental Protection (NDEP). The NDEP is the lead regulatory agency for environmental issues at HWAD. The purpose of the sampling was to determine the extent and degree of environmental impacts, if any, associated with activities performed at each SWMU. The primary goal of the investigation was to assess the environmental impacts at each SWMU and to report the findings, present conclusions, and recommend any remediation if necessary.

With guidance from the NDEP, basewide proposed closure goals (PCGs) for soil were established as acceptable levels so that SWMU closure could be recommended and to assist in directing the investigative efforts toward those SWMUs where the target analytes were of greatest concern (Appendix B). These PCGs were used as action levels throughout this investigation and are used for comparison with the detected analytes in this report.

2.0 Site History

SWMU B11a is in the HWAD's central magazine area, on the south central side of the 101 Production Area (Figure 1-1). It is an inactive unlined catchment pit on the northwest side of Building 101-31 (Figure 1-2). The catchment pit measures 45 by 20 feet and is three feet deep.

The USACE, HWAD and the NDEP agreed to define the boundaries of each SWMU using annotated monuments and survey pins. As part of E&E's 1997 field investigations, a survey monument was constructed and surveyed at SWMU B11a. A brass survey pin on the monument designates the monument number HWAAP-79-1996 and the SWMU number B11a. Three corner pins were set and surveyed to define the SWMU boundary with the monument as the northwest corner. The location of these corner markers and the SWMU boundary are shown on Figure 1-2. Survey data is presented in Appendix B.

3.0 Site Conditions

Soils encountered during E&E's 1994 remedial investigation of SWMU B11a were primarily fine sands, which graded to silty sands beneath the catchment pit. During E&E's 1994 investigation and Tt's 1997 first and second quarter ground water monitoring (Tt 1997a, 1997b), the depth to ground water was measured at approximately 100 feet bgs.

The catchment pit at SWMU B11a reportedly was in operation from 1940 to the early 1970s and received large amounts of reactive hazardous wastewater containing TNT and cyclotrimethylenetrinitramine (RDX). The wastes discharged into the catchment pit also may have included picric acid, Composition A, Composition B, various propellant and pyrotechnic compositions, pentaerythrite tetranitrate (PETN), and Amitol (USATHAMA 1977). Based on the past uses of the pit and observations made during the site inspections, the target analytes are known to be explosives and metals.

4.0 INVESTIGATIONS

Site inspections of SWMU B11a were conducted by the USAEHA (1988), Jacobs Engineering (1988), and RAI (1992). During these inspections, evidence of TNT-stained soil was noted in the catchment pit. No investigation activities were conducted during these inspections, and no samples were collected from the SWMU at that time. In 1989, WaterWork Corporation conducted a ground water investigation in response to a July 1987 closure order issued for the 101 Production Area by the NDEP (WaterWork 1990). This ground water investigation included installing and sampling eight ground water monitoring wells at selected SWMUs in the area. Field screening activities conducted by E&E during the 1994 remedial investigations were limited to headspace soil sample screening for volatile organic compounds (VOCs) and visual screening for explosives. The soil samples collected in 1994 by E&E did not have any visible TNT.

In late 1998 questions began to arise that the red stained soil may not be explosives contaminated soil; and as in other SWMU's, the high levels of explosives contamination detected by field test methods were not being confirmed by laboratory analysis. The Corps of Engineers took samples of the stained soil in March 1999 from several sites in the 101 area including SWMU B-11a.

Investigation Results

Arsenic (3.5 mg/kg to 5.7 mg/kg), barium (96 mg/kg to 220 mg/kg), total chromium (3.1 mg/kg to 4 mg/kg), and lead (4.7 mg/kg to 5.6 mg/kg) were detected in both surface and near-surface samples collected at SWMU B11a. Beryllium, cadmium, mercury, and selenium were not detected in these samples.

Arsenic (3.2 mg/kg to 4.6 mg/kg), barium (74 mg/kg to 77 mg/kg), total chromium (7.1 mg/kg to 12 mg/kg), and lead (3.9 mg/kg to 4.7 mg/kg) were detected in both the 6.5-foot

and 11.5-foot subsurface soil samples collected at SWMU B11a. Beryllium, cadmium, mercury, and selenium were not detected in either of the subsurface samples.

All of the metals concentration were below PCG's and in general at or below background levels.

Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX) (3.4 mg/kg to 5 mg/kg), RDX (20 mg/kg to 29 mg/kg), sym-trinitrobenzene (TNB) (18 mg/kg to 20 mg/kg), TNT (110 mg/kg to 180 mg/kg), and picric acid (0.30 mg/kg to 0.38 mg/kg) were detected in both the surface and near-surface samples. No other explosive compounds were detected in these samples.

None of the explosives compounds were detected in the two subsurface soil samples collected at this SWMU.

The Corps of Engineers sample taken from the pit area of B-11a indicated a TNT concentration of 110 ppm.

The laboratory results indicated TNT levels above surface action levels. Because the B-11a pit was only 3' deep the surface contamination levels, not the excavation levels, applied to the bottom area of the pit. Therefore, remediation was required.

6.0 Remediation

The explosives contaminated soil from SWMU B-11a was treated by windrow composting. Composting is a natural process in which microorganisms biologically degrade organic material. For the destruction of the explosives contamination temperatures in the compost must reach between 120° F — 160° F and the system must remain in aerobic conditions. The windrow system of composting was selected as the most efficient and economical to be used at the site. Thirty-three (33) cubic yards of contaminated soil was removed from B-11a and placed in compost windrows. Confirmation samples, from the excavated area and finished compost, were taken in accordance with the project work plan.

7.0 Remediation Results

Contaminated soil from B-11a was placed into one (1) windrow at remediation pad 1 (windrow 2B). After the treatment process the windrows were sampled for explosives and the test results are shown in appendix D; along with the windrow temperature graphs. The location of the confirmation samples taken in the B-11a excavation area are shown in figure 4 with the analytical results of these tests also shown in appendix D.

8.0 Public Involvement:

It is the U.S. Department of Defense and Army policy to involve the local community throughout the investigation process at an installation. To initiate this involvement, HWAD has established and maintains a repository library at the local public library. This repository includes final copies of all past studies and other documents regarding environmental issues at HWAD. As future environmental documents are made available to HWAD the repository shall be updated.

HWAD has solicited community participation in establishment of a restoration and advisory board (RAB). To date there has been insufficient response and HWAD has not formed a RAB. HWAD has held open houses to inform the public of on going environmental issues. HWAD continues to solicit community involvement, and will establish a RAB should sufficient community interest be obtained.

9.0 Conclusions and Recommendations

The contaminated soil has been removed from SWMU B-11a and has been treated in the composting windrows to levels below clean up goals. SWMU B-11a should be closed with the restrictions that no structure be constructed on the SWMU, that the site remain only for industrial use and documented on the depot site master plan.

10.0 REFERENCES

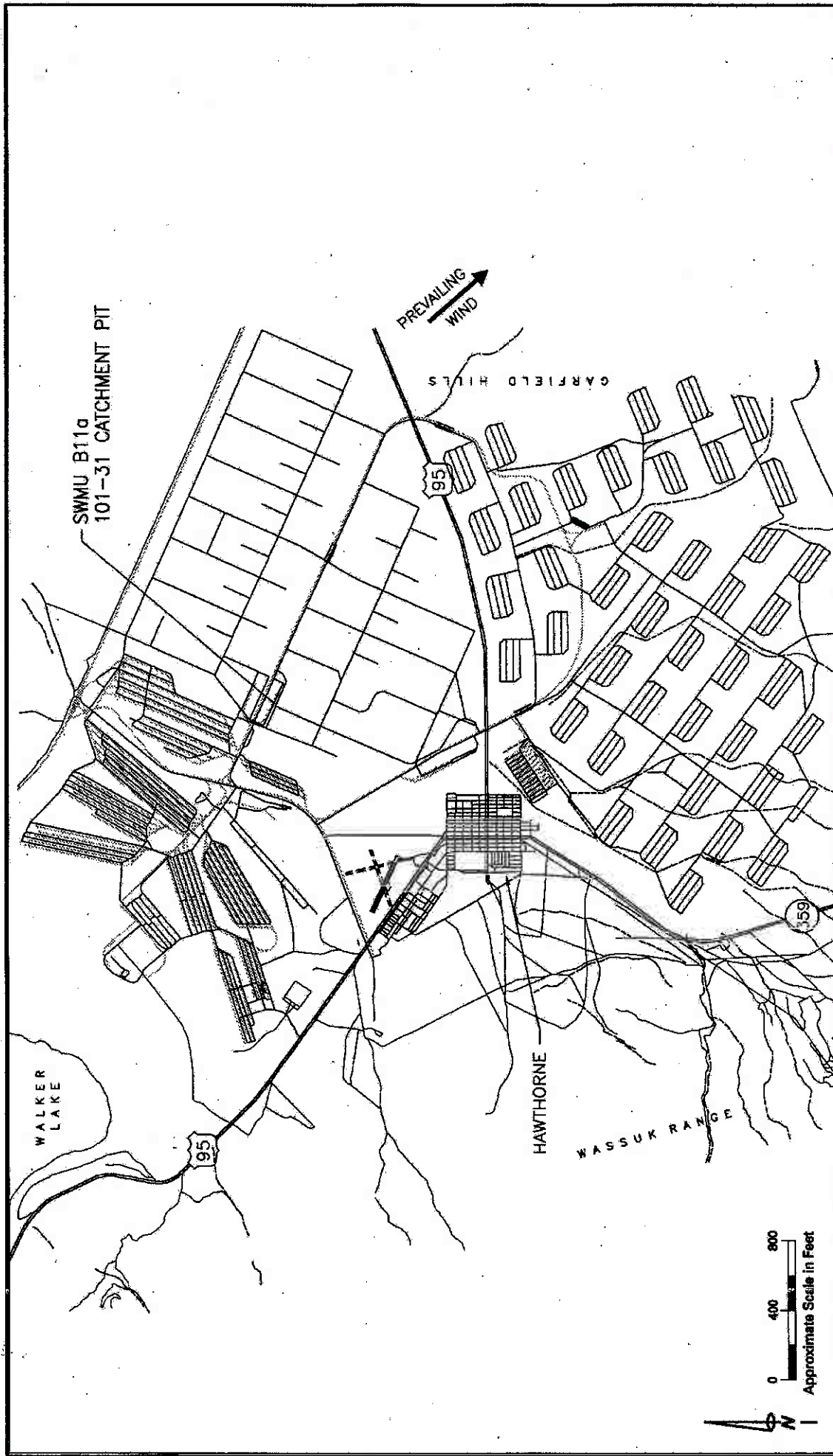
- Ecology and Environment. 1995. RCRA Facility Assessment Report for 24 Solid Waste Management Units, Hawthorne Army Depot, Hawthorne, Nevada. April 1995.
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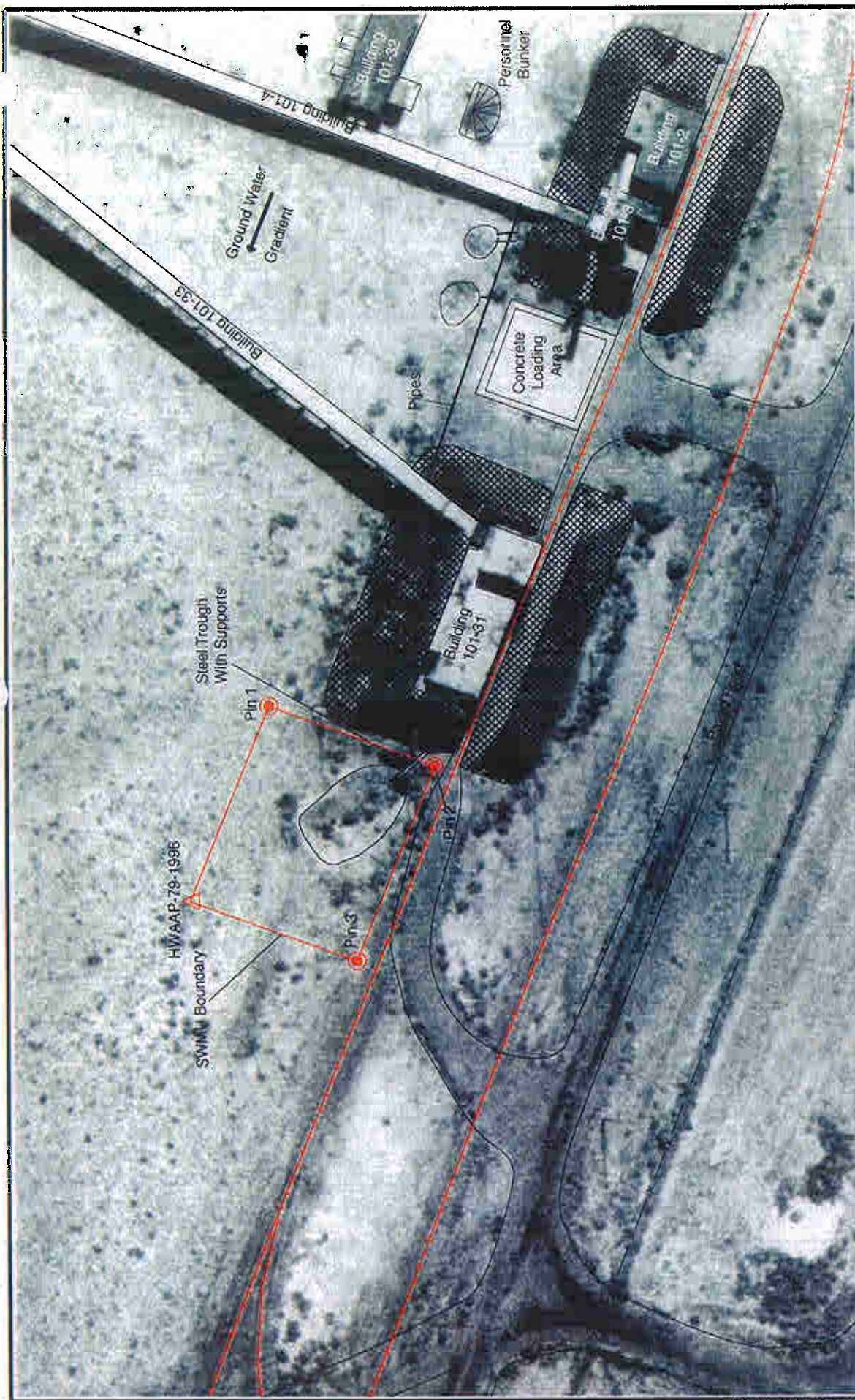


SOURCE: TETRA TECH FINAL DATA PACKAGE, 1996 (REV. 1997)

Location Map

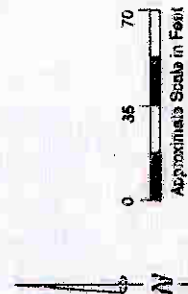
SWMU B11a

Hawthorne Army Depot
Hawthorne, Nevada



Legend:

- Boundary Corner Pin
- Explosion Barrier
- Fence
- Railroad
- SWMU Monument



Site Map
SWMU B11a
101-31 Catchment Pit
 Hawthorne Army Depot
 Hawthorne, Nevada
Figure 1-2



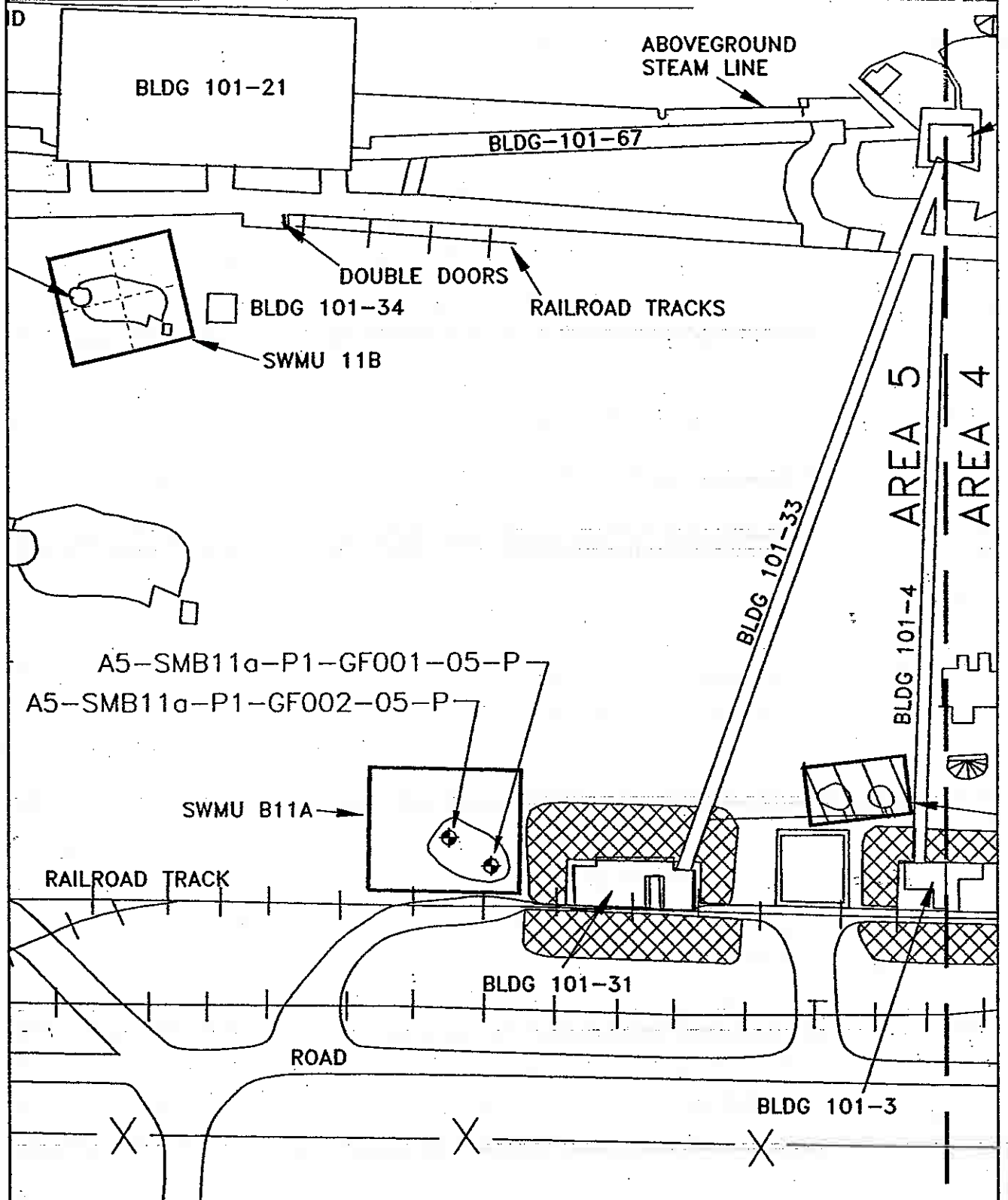
Investigation Activity Map
SWMU B11a
101-31 Catchment Pit
 Hawthorne Army Depot
 Hawthorne, Nevada
Figure 3-1

Legend:

Boundary Corner Pin
 Hand Auger Location
 Soil Boring Location

Explosion Barrier
 Fence
 Railroad
 SWMU Monument

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DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT,
CORPS OF ENGINEERS
JANUARY 2000

HAWTHORNE

HEVADA

HAWTHORNE ARMY DEPOT
WEST 101 PROJECTION AREA

SITE MAP (AREA 5)-
SOIL SAMPLE LOCATIONS

SCALE:

1" = 100'

FIGURE:

4

Appendix A

**Proposed Closure Goals
Hawthorne Army Depot
Hawthorne, Nevada**

Constituent of Concern	Chemical Classification	Carcinogenic (C) or Non-Carcinogenic (NC)	HWAD Proposed Closure Goals for Soil (mg/kg)	HWAD Proposed Closure Goal Source
Nitrate	Anion	NC	128,000	Calculated Subpart S ^a
2-Amino-dinitrotoluene	Explosive	NC	-	NA ^a
4-Amino-dinitrotoluene	Explosive	NC	-	NA
1,3-Dinitrobenzene	Explosive	NC	8	Calculated Subpart S
2,4-Dinitrotoluene	Explosive	NC	160	Calculated Subpart S
2,6-Dinitrotoluene	Explosive	NC	80	Calculated Subpart S
HMX	Explosive	NC	4,000	Calculated Subpart S
Nitrobenzene	Explosive	NC	40	Calculated Subpart S
Nitrotoluene (2-, 3-, 4-)	Explosive	NC	800	Calculated Subpart S
RDX	Explosive	NC	64	Calculated Subpart S
Tetryl	Explosive	NC	800	Calculated Subpart S
1,3,5-Trinitrobenzene	Explosive	NC	4	Calculated Subpart S
2,4,6-Trinitrotoluene	Explosive	C	233	Calculated Subpart S
Aluminum	Metal	NC	80,000	Calculated Subpart S
Arsenic (cancer endpoint)	Metal	C & NC	30	Background ^c
Barium and compounds	Metal	NC	5,600	Calculated Subpart S
Beryllium and compounds	Metal	C	1	Background
Cadmium and compounds	Metal	NC	40	Calculated Subpart S
Chromium III and compounds	Metal	NC	80,000	Calculated Subpart S
Lead	Metal	NC	1000	PRG ^d
Mercury and compounds (inorganic)	Metal	NC	24	Calculated Subpart S
Selenium	Metal	NC	400	Calculated Subpart S
Silver and compounds	Metal	NC	400	Calculated Subpart S
Acenaphthene	PAH	NC	4,800	Calculated Subpart S
Benzo[a]anthracene	PAH	C	0.96	Calculated Subpart S
Benzo[a]pyrene	PAH	C	0.10	Detection Limit ^e
Benzo[b]fluoranthene	PAH	C	0.96	Calculated Subpart S
Benzo[k]fluoranthene	PAH	C	10	Calculated Subpart S
Chrysene	PAH	C	96	Calculated Subpart S
Dibenz[ah]anthracene	PAH	C	0.96	Calculated Subpart S
Fluoranthene	PAH	NC	3,200	Calculated Subpart S
Fluorene	PAH	NC	3,200	Calculated Subpart S
Indeno[1,2,3-cd]pyrene	PAH	C	-	NA
Naphthalene	PAH	NC	3,200	Calculated Subpart S
Pyrene	PAH	NC	2,400	Calculated Subpart S
Total Petroleum Hydrocarbons as Diesel (TPH-d)	PAH	C	100	NDEP Level Clean-up ^f
Polychlorinated biphenyls (PCBs)	PCBs	C	25	TSCA ^g
Bis(2-ethylhexyl)phthalate (DEHP)	SVOC	C	1,600	Calculated Subpart S
Bromoform (tribromomethane)	SVOC	C	89	Calculated Subpart S

**Proposed Closure Goals
Hawthorne Army Depot
Hawthorne, Nevada**

Constituent of Concern	Chemical Classification	Carcinogenic (C) or Non-carcinogenic (NC)	HWAD Proposed Closure Goals for Soil (mg/kg)	HWAD Proposed Closure Goal Source
Butyl benzyl phthalate	SVOC	NC	15,000	Calculated Subpart S
Dibromochloromethane	SVOC	C	83	Calculated Subpart S
Dibutyl-phthalate	SVOC	NC	8,000	Calculated Subpart S
Diethyl phthalate	SVOC	NC	64,000	Calculated Subpart S
Phenanthrene	SVOC			NA
Phenol	SVOC	NC	48,000	Calculated Subpart S
Acetone	VOC	NC	800	Calculated Subpart S
Anthracene	VOC	NC	24,000	Calculated Subpart S
Benzene	VOC	C	24	Calculated Subpart S
Bis(2-chloroisopropyl) ether	VOC	C	3,200	Calculated Subpart S
Bromomethane	VOC	NC	112	Calculated Subpart S
Carbon tetrachloride	VOC	C	5	Calculated Subpart S
Chlorobenzene	VOC	NC	1,600	Calculated Subpart S
Chloroform	VOC	C	115	Calculated Subpart S
Chloromethane	VOC	C	538	Calculated Subpart S
Dibromomethane	VOC	C	0,008	Calculated Subpart S
1,2-Dichlorobenzene	VOC	NC	7,200	Calculated Subpart S
1,4-Dichlorobenzene	VOC	C	18,300	Calculated Subpart S
Dichlorodifluoromethane	VOC	C	16,000	Calculated Subpart S
Ethylbenzene	VOC	NC	8,000	Calculated Subpart S
Methylene bromide	VOC	NC	800	Calculated Subpart S
Methylene chloride	VOC	C	4,800	Calculated Subpart S
2-Methylnaphthalene	VOC			NA
1,1,2,2-Tetrachloroethane	VOC	C	35	Calculated Subpart S
Tetrachloroethylene (PCE)	VOC	C & NC	800	Calculated Subpart S
Toluene	VOC	NC	16,000	Calculated Subpart S
1,1,1-Trichloroethane	VOC	NC	7,200	Calculated Subpart S
Trichloroethylene (TCE)	VOC	C & NC	480	Calculated Subpart S
Trichlorofluoromethane	VOC	NC	24,000	Calculated Subpart S
1,2,3-Trichloropropane	VOC	C	480	Calculated Subpart S
Vinyl chloride	VOC	C	0.37	Calculated Subpart S
Xylene Total (m-, o-, p-)	VOC	NC	160,000	Calculated Subpart S
2,3,7,8-TCDD	Dioxin	C	0.000005	Calculated Subpart S

* RCRA 55 FR 30870

* Not available

* Highest background concentration detected in 50 background soil samples

* Smucker, Stanford J. USEPA Region IX, Preliminary Remedial Goals, Second Half, Sep. 1995

* Method detection limit for Volatile Organic Compounds by EPA Method 8260 or

Semi-Volatile Organic Compounds analyzed by EPA Method 8270

* Nevada Division of Environmental Protection

* Cleanup level for PCB spills in accordance with Toxic Substance and Control Act Spill Policy Guidelines 40 CFR 761

SAP (9/98, Final) - West 101 Production Area (HWAD)

Proposed Excavation Goal (PEG's) by Definitive and Screening * Analysis-
Maximum Concentration of Contaminants
In Soil to Be Left in Place at Depth Below the Surface

Contaminant	Concentration (mg/kg)
2,4,6,-trinitrotoluene (TNT)	800*
2,4-dinitrotoluene (2,4-DNT)	80
2,6-dinitrotoluene (2,6-DNT)	80
1,3,5-trinitrobenzene (1,3,5-TNB)	150
1,3,-drinitrobenzne (1,3-DNB)	NE
2-amino-4,6dinitrotoluene (2-Am-DNT)	NE
4-amino-2,6-dinitrotoluene (4-Am-DNT)	NE
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	4000
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	300
Picric acid	7.0
Pentachlorophenol	NE
Nitroaromatics/Nitroamines	<30

SAP (9/98, Final) - West 101 Production Area (HWAD)

Clean-up Goals by Screening* and Definitive Analysis

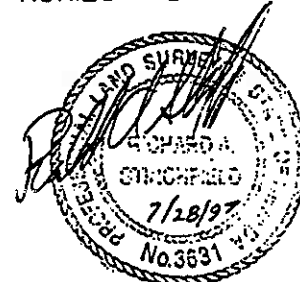
Contaminant	Concentration (mg/kg)
2,4,6,-trinitrotoluene (TNT)	40*
2,4-dinitrotoluene (2,4-DNT)	2.6
2,6-dinitrotoluene (2,6-DNT)	2.6
1,3,5-trinitrobenzene (1,3,5-TNB)	4
1,3,-drinitrobenzne (1,3-DNB)	8
2-amino-4,6dinitrotoluene (2-Am-DNT)	NE
4-amino-2,6-dinitrotoluene (4-Am-DNT)	NE
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	100
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	64
Picric acid	7
Pentachlorophenol	None

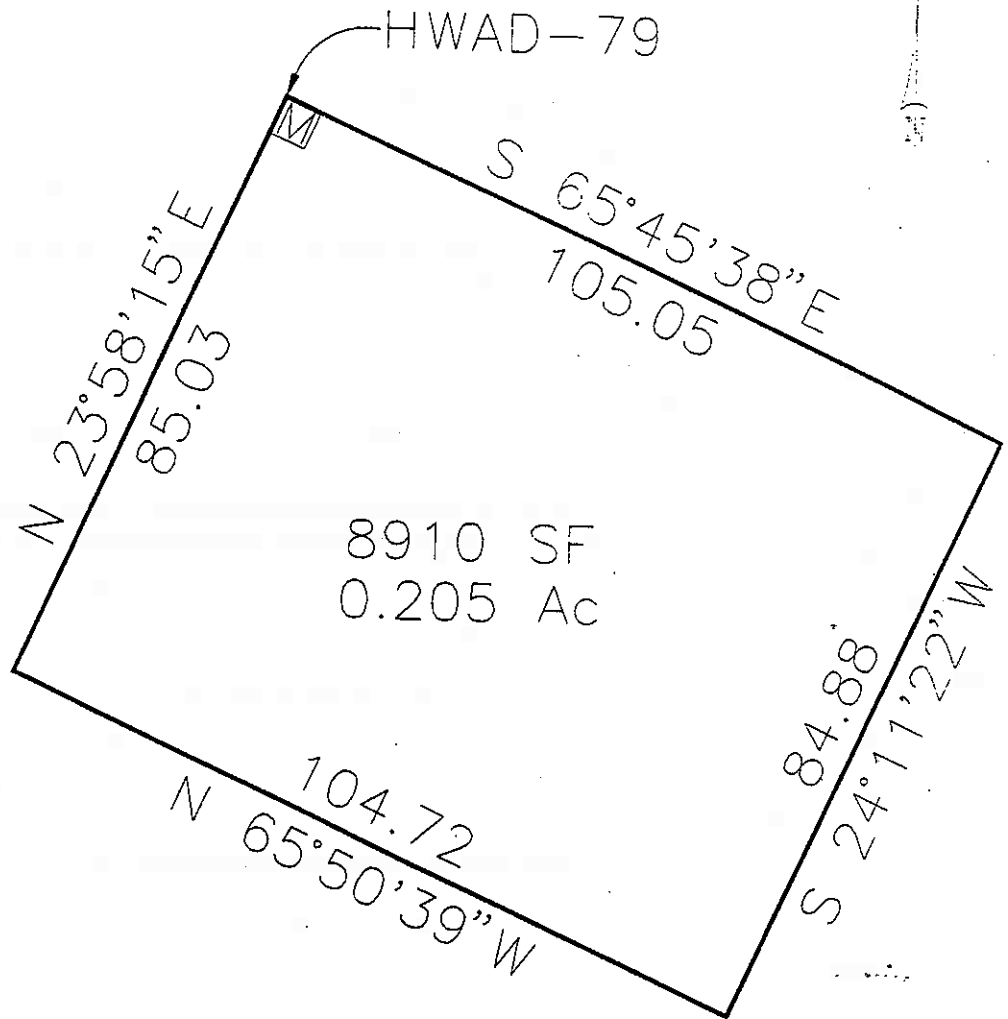
NE - not established

Appendix B

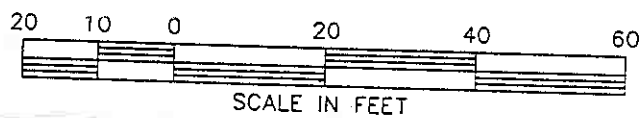
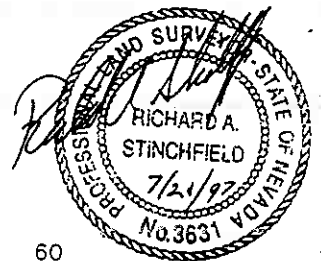
NOTES

1. FOR THE LOCATION OF THE FOLLOWING SWMU'S, REFER TO FIGURE 3-6 OF THE "FINAL R.C.R.A. FACILITY INVESTIGATION REPORT OF GROUP "A" SOLID WASTE MANAGEMENT UNITS A-04, B-16, B-21, B-24, B-26, AND H-01".
2. THE "HWAD" MONUMENTS AS SHOWN HEREIN AS "M", ARE A 1' X 1' X 2'+ CONCRETE MONUMENT WITH A BRASS CAP STAMPED AS PER SPECIFICATIONS. ALL OF THE OTHER CORNERS ARE MARKED BY A 5/8" RE-BAR WITH A PLASTIC CAP STAMPED "STINCHFIELD PLS 3631" UNLESS NOTED OTHERWISE ON THE MAPS.
3. HORIZONTAL DATUM IS BASED ON NAD 83(1994) AND MORE SPECIFICALLY, NGS STATION "W 2". "W 2" IS A FEDERAL BASE NETWORK CONTROL STATION AND IS LOCATED IN THE APPROXIMATE CENTER OF THIS PROJECT.
4. VERTICAL DATUM IS BASED ON NAVD 29. NAVD 88 ELEVATIONS HAVE BEEN SCALED AND THEREFORE ARE NOT ACCURATE. VERTICAL CONTROL USING GPS WAS USED TO ESTABLISH THE ELEVATIONS OF THE EXISTING CONTROL POINTS AND THE "HWAD" MONUMENTS. THE VALUE OF NGS STATION "W 2" WAS USED AS A BASIS FOR THE VERTICAL CONTROL.
5. COORDINATE VALUES OF EXISTING NGS CONTROL, TRAVERSE POINTS, AND HWAD MONUMENTS ARE STATE PLANE COORDINATES, WEST ZONE.
6. THE COMBINED FACTOR WAS CALCULATED USING THE FOLLOWING FIGURES. THE "MAP SCALE" AT POINT "W 2" IS 0.99990022, THE MEAN ELEVATION OF THE TOTAL PROJECT WAS TAKEN AS 4150.00 FEET ABOVE SEA LEVEL AND THE MEAN RADIUS OF THE EARTH WAS TAKEN AS 20,906,000 FEET. THE SEA LEVEL FACTOR WAS CALCULATED AS FOLLOWS: $20,906,000 / 20,906,000 + 4150.00 = 0.999801532$. THE COMBINED FACTOR (CF) WAS CALCULATED AS FOLLOWS: $0.99990022 \times 0.999801532 = 0.999701772$.
7. GROUND DISTANCE X CF (0.999801532) = GRID DISTANCE.
8. GRID DISTANCE X INVERSE CF (1.00298317) = GROUND DISTANCE.
9. COORDINATE VALUES OF ALL OTHER POINTS INCLUDING SWMU CORNERS OTHER THAN "HWAD" MONUMENTS, REFERENCE POINTS, TEST PIT OR HOLE LOCATIONS ETC., WERE CALCULATED USING GROUND DISTANCES AND ARE THEREFORE NOT TRUE STATE PLANE COORDINATES.
10. DISTANCES AS SHOWN ON THESE SWMU'S ARE HORIZONTAL GROUND DISTANCES.





NW COR	N	14512312.763	E	2622286.426	ELEV	4190.843
NE COR	N	14512269.636	E	2622382.211	ELEV	4192.333
SE COR	N	14512192.211	E	2622347.432	ELEV	4195.424
SW COR	N	14512235.065	E	2622251.880	ELEV	4193.853



SWMU B11a Survey Data
Hawthorne Army Depot
Hawthorne, Nevada

SWMU	Point ID	Northing (feet)	Easting (feet)	Elevation
B11a	HA01	1388901.81	497919.06	NE
B11a	CPS01	1388927.81	497908.26	NE
B11a	Pin 3	1388902.39	497848.29	4193.853
B11a	Pin 2	1388859.54	497943.84	4195.424
B11a	Pin 1	1388936.97	497978.62	4192.333
B11a	HWAAP-79-1996	1388980.09	497882.83	4190.843

Notes:

NE = Not established

Coordinate data based on electronic map file using the NAD 1927 datum.

Elevation data based on surveyors map using NGVD 1929 datum.

Appendix C

Nitrogen
Method 353.2 (ASC)

Sample ID	Location ID	Sample Date	Depth	Lab	Nitrogen Nitrate mg/kg
B11A-HA1-1-000	HA01	5/2/94	0.5	ASC	8.1
B11A-HA1-1-005	HA01	5/2/94	5	ASC	6.9
B11A-CPS1-1-007	CPS01	5/22/94	7	ASC	9.4
B11A-CPS1-1-012	CPS01	5/22/94	12	ASC	14
Analyses					4
Detections					4
Minimum Concentration					6.9
Maximum Concentration					14
HWAD - PCG					128000
HWAD - PCG Hits					0

Metals
Method 6010A (ASC)

Sample ID	Location ID	Sample Date	Depth	Lab	Barium mg/kg	Beryllium mg/kg	Cadmium mg/kg	Chromium Total mg/kg	Silver mg/kg	Arsenic mg/kg	Lead mg/kg	Selenium mg/kg
B11A-HA1-1-000	HA01	5/2/94	0.5	ASC	96	<0.52	<0.52	3.1	<1	NA	NA	NA
B11A-HA1-1-005	HA01	5/2/94	5	ASC	220	<0.55	<0.55	4	<1.1	5.7	5.6	<0.55
B11A-CPS1-1-007	CPS01	5/22/94	7	ASC	74	<0.53	<0.53	12	<1.1	3.2	4.7	<0.53
B11A-CPS1-1-012	CPS01	5/22/94	12	ASC	77	<0.52	<0.52	7.1	<1	4.6	3.9	<0.52
Analyses					4	4	4	4	4	3	3	3
Detections					4	0	0	4	0	3	3	0
Minimum Concentration					74	0	0	3.1	0	3.2	3.9	0
Maximum Concentration					220	0	0	12	0	5.7	5.6	0
HWAD - PCG					2000	1	20	20	100	100	100	20
HWAD - PCG Hits					0	0	0	0	0	0	0	0

Notes:

NA = Not analyzed

NE = Not established

Zero values listed for maximum and minimum concentrations indicate a nondetect value for that analyte.

Metals
Method 7060 (ASC)

Sample ID	Location ID	Sample Date	Depth	Lab	Arsenic mg/kg
B11A-HA1-1-000	HA01	5/2/94	0.5	ASC	3.5
B11A-HA1-1-005	HA01	5/2/94	5	ASC	5.7
B11A-CPS1-1-007	CPS01	5/22/94	7	ASC	3.2
B11A-CPS1-1-012	CPS01	5/22/94	12	ASC	4.6
Analyses					4
Detections					4
Minimum Concentration					3.2
Maximum Concentration					5.7
HWAD - PCG					100
HWAD - PCG Hits					0

Notes:

NA = Not analyzed

NE = Not established

Zero values listed for maximum and minimum concentrations indicate a nondetect value for that analyte.

Metals
Method 7421 (ASC)

Sample ID	Location ID	Sample Date	Depth	Lab	Lead
					mg/kg
B11A-HA1-1-000	HA01	5/2/94	0.5	ASC	4.7
B11A-HA1-1-005	HA01	5/2/94	5	ASC	5.6
B11A-CPS1-1-007	CPS01	5/22/94	7	ASC	4.7
B11A-CPS1-1-012	CPS01	5/22/94	12	ASC	3.9

Analyses	4
Detections	4
Minimum Concentration	3.9
Maximum Concentration	5.6
HWAD - PCG	100
HWAD - PCG Hits	0

Notes:

NA = Not analyzed

NE = Not established

Zero values listed for maximum and minimum concentrations indicate a nondetect value for that analyte.

Mercury
Method 7471 (ASC)

Sample ID	Location ID	Sample Date	Depth	Lab	Mercury
					mg/kg
B11A-HA1-1-000	HA01	5/2/94	0.5	ASC	<0.1
B11A-HA1-1-005	HA01	5/2/94	5	ASC	<0.11
B11A-CPS1-1-007	CPS01	5/22/94	7	ASC	<0.11
B11A-CPS1-1-012	CPS01	5/22/94	12	ASC	<0.1
Analyses					4
Detections					0
Minimum Concentration					0
Maximum Concentration					0
HWAD - PCG					24
HWAD - PCG Hits					0

Notes:

NA = Not analyzed

NE = Not established

Zero values listed for maximum and minimum concentrations indicate a nondetect value for that analyte.

Metals
Method 7740 (ASC)

Sample ID	Location ID	Sample Date	Depth	Lab	Selenium mg/kg
B11A-HA1-1-000	HA01	5/2/94	0.5	ASC	<0.52
B11A-HA1-1-005	HA01	5/2/94	5	ASC	<0.55
B11A-CPS1-1-007	CPS01	5/22/94	7	ASC	<0.53
B11A-CPS1-1-012	CPS01	5/22/94	12	ASC	<0.52

Analyses	4
Detections	0
Minimum Concentration	0
Maximum Concentration	0
HWAD - PCG	20
HWAD - PCG Hits	0

Notes:

NA = Not analyzed

NE = Not established

Zero values listed for maximum and minimum concentrations indicate a nondetect value for that analyte.

**Explosives
Method 8330 (ASC)**

Sample ID	Location ID	Sample Date	Depth	Lab	2,4,6-TNT mg/kg	2,4-Dinitrotoluene mg/kg	2,6-Dinitrotoluene mg/kg	2-Amino-4,6-DNT mg/kg	2-Nitrotoluene mg/kg	3-Nitrotoluene mg/kg	4-Amino-2,6-DNT mg/kg
B11A-HA1-1-000	HA01	5/2/94	0.5	ASC	110	<1	<1	<1	<1	<1	<1
B11A-HA1-1-005	HA01	5/2/94	5	ASC	180	<1	<1	<1	<1	<1	<1
B11A-CPS1-1-007	CPS01	5/22/94	7	ASC	<1	<1	<1	<1	<1	<1	<1
B11A-CPS1-1-012	CPS01	5/22/94	12	ASC	<1	<1	<1	<1	<1	<1	<1
Analyses					4	4	4	4	4	4	4
Detections					2	0	0	0	0	0	0
Minimum Concentration					110	0	0	0	0	0	0
Maximum Concentration					180	0	0	0	0	0	0
HWAD - PCG					233	2.6	80	NE	800	800	NE
HWAD - PCG Hits					0	0	0	NE	0	0	NE

Notes:

NA = Not analyzed

NE = Not established

Zero values listed for maximum and minimum concentrations indicate a nondetect value for that analyte.

Explosives
Method 8330 (ASC)

Sample ID	Location ID	Sample Date	Depth	Lab	4-Nitrotoluene mg/kg	HMX mg/kg	m-Dinitrobenzene mg/kg	Nitrobenzene mg/kg	RDX mg/kg	sym-Trinitrobenzene mg/kg	Tetryl mg/kg
B11A-HA1-1-000	HA01	5/2/94	0.5	ASC	<1	3.4	<1	<1	20 ^x	20 ^x	<1
B11A-HA1-1-005	HA01	5/2/94	5	ASC	<1	5	<1	<1	29 ^x	18 ^x	<1
B11A-CPS1-1-007	CPS01	5/22/94	7	ASC	<1	<1	<1	<1	<1	<1	<1
B11A-CPS1-1-012	CPS01	5/22/94	12	ASC	<1	<1	<1	<1	<1	<1	<1
Analyses					4	4	4	4	4	4	4
Detections					0	2	0	0	2	2	0
Minimum Concentration					0	3.4	0	0	20	18	0
Maximum Concentration					0	5	0	0	29	20	0
HWAD - PCG					800	4000	8	40	64	4	800
HWAD - PCG Hits					0	0	0	0	0	2	0

Notes:

NA = Not analyzed

NE = Not established

Zero values listed for maximum and minimum concentrations indicate a nondetect value for that analyte.

Picric Acid
Method 8330M (ASC)

Sample ID	Location ID	Sample Date	Depth	Lab	Picric Acid mg/kg
B11A-HA1-1-000	HA01	5/2/94	0.5	ASC	0.3
B11A-HA1-1-005	HA01	5/2/94	5	ASC	0.38
B11A-CPS1-1-007	CPS01	5/22/94	7	ASC	<0.25
B11A-CPS1-1-012	CPS01	5/22/94	12	ASC	<0.25
Analyses					4
Detections					2
Minimum Concentration					0.3
Maximum Concentration					0.38
HWAD - PCG					7
HWAD - PCG Hits					0

Appendix D

Windrow Confirmation Samples

SWMU B-11a

Applied P & Ch Laboratory

13760 Magnolia Ave. Chino CA 91710

Tel: (909) 590-1828 Fax: (909) 590-1498

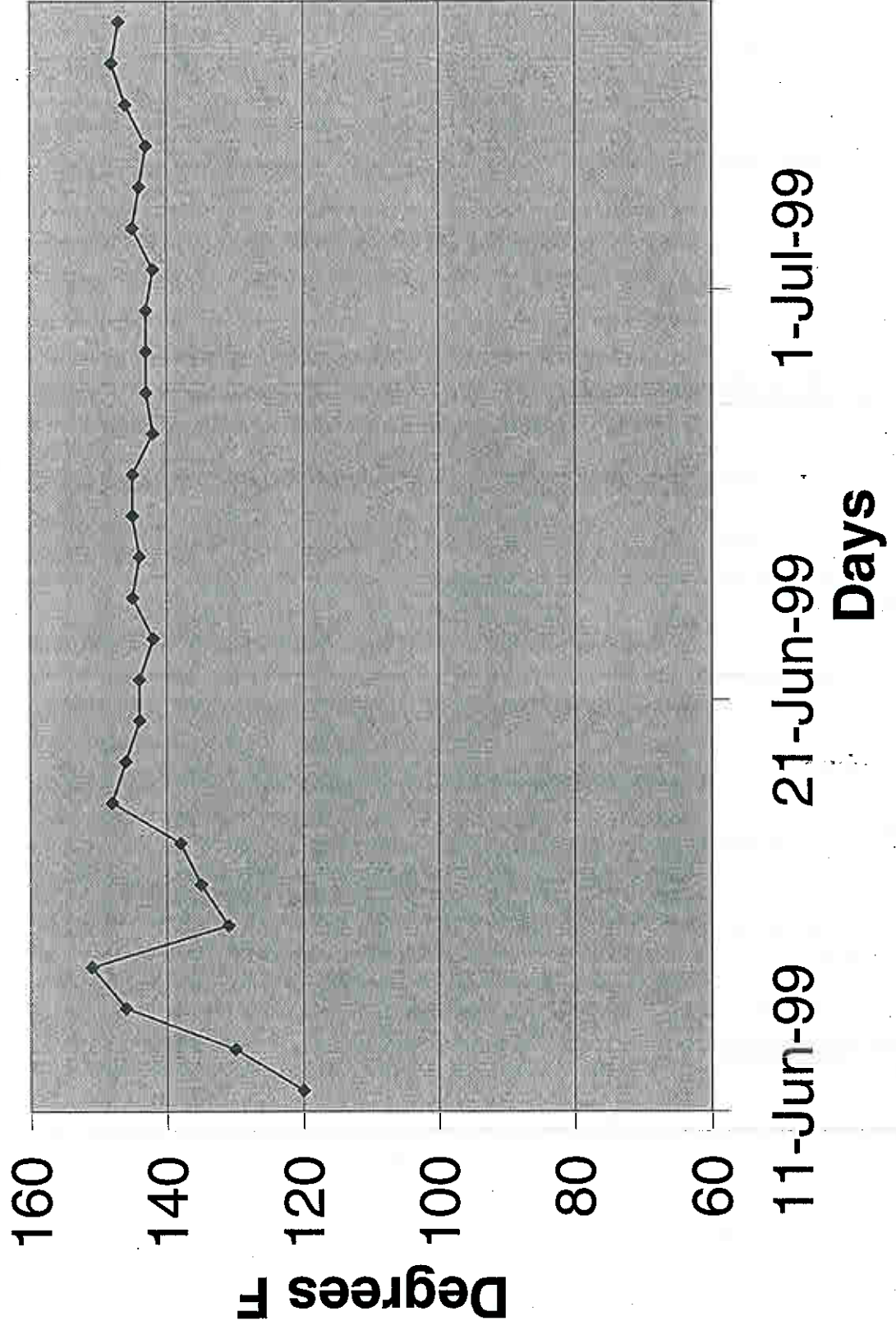
APCL Analytical Report

Component Analyzed	Method	Unit	PQL	Analysis Result	
				A3-WR002BC001-CC002P	A3-WR002BC002-CC002P
				99-04434-7	99-04434-8
NITROAROMATICS AND NITROAMINES					
Dilution Factor				1	1
4-AMINO-2,6-DINITROTOLUENE	8330	mg/kg	0.2	<0.38	<0.25
2-AMINO-4,6-DINITROTOLUENE	8330	mg/kg	0.2	<0.38	<0.25
1,3-DINITROBENZENE	8330	mg/kg	0.25	<0.48	<0.31
2,4-DINITROTOLUENE	8330	mg/kg	0.25	<0.48	<0.31
2,6-DINITROTOLUENE	8330	mg/kg	0.25	<0.48	<0.31
HMX	8330	mg/kg	0.25	<0.48	<0.31
NITROBENZENE	8330	mg/kg	0.25	<0.48	<0.31
3-NITROTOLUENE	8330	mg/kg	0.25	<0.48	<0.31
RDX	8330	mg/kg	0.25	<0.48	<0.31
TETRYL	8330	mg/kg	0.25	<0.48	<0.31
1,3,5-TRINITROBENZENE	8330	mg/kg	0.25	<0.48	<0.31
2,4,6-TRINITROTOLUENE	8330	mg/kg	0.25	<0.48	0.97
2-NITROTOLUENE (a)	8330	mg/kg	0.25	<0.48	<0.31
4-NITROTOLUENE (a)	8330	mg/kg	0.25	<0.48	<0.31

Component Analyzed	Method	Unit	PQL	Analysis Result	
				A3-WR002BC003-CC002P 99-04434-9	A3-WR002BC004-CC002P 99-04434-10
MOISTURE, PERCENT IN SOIL	ASTM-D2216	%Moisture	0.5	19.7	18.6
NITROAROMATICS AND NITROAMINES					
Dilution Factor				1	1
4-AMINO-2,6-DINITROTOLUENE	8330	mg/kg	0.2	<0.25	<0.25
2-AMINO-4,6-DINITROTOLUENE	8330	mg/kg	0.2	<0.25	<0.25
1,3-DINITROBENZENE	8330	mg/kg	0.25	<0.31	<0.31
2,4-DINITROTOLUENE	8330	mg/kg	0.25	<0.31	<0.31
2,6-DINITROTOLUENE	8330	mg/kg	0.25	<0.31	<0.31
HMX	8330	mg/kg	0.25	<0.31	<0.31
NITROBENZENE	8330	mg/kg	0.25	<0.31	<0.31
3-NITROTOLUENE	8330	mg/kg	0.25	<0.31	<0.31
RDX	8330	mg/kg	0.25	0.2J	<0.31
TETRYL	8330	mg/kg	0.25	<0.31	<0.31
1,3,5-TRINITROBENZENE	8330	mg/kg	0.25	<0.31	<0.31
2,4,6-TRINITROTOLUENE	8330	mg/kg	0.25	0.09J	<0.31
2-NITROTOLUENE (a)	8330	mg/kg	0.25	<0.31	<0.31
4-NITROTOLUENE (a)	8330	mg/kg	0.25	<0.31	<0.31

Component Analyzed	Method	Unit	PQL	Analysis Result	
				A3-WR005BC001-CC001P 99-04434-11	A3-WR005BC002-CC001P 99-04434-12
MOISTURE, PERCENT IN SOIL	ASTM-D2216	%Moisture	0.5	36.1	21.5

Windrow 2B Temperatures



Confirmation Soil Samples

SWMU B-11a

Applied P & Ch Laboratory

13760 Magnolia Ave. Chino CA 91710

Tel: (909) 590-1834 Fax: (909) 590-1498

Submitted to:

Tetra Tech, Inc. (San Francisco)

Attention: Roy Roenbeck

180 Howard St. Ste. 250

San Francisco CA 94105

Tel: (415) 974-1221 Fax: (415) 974-5914

APCL Analytical Report

Service ID #: 801-994287

Collected by: D. Gonzales

Collected on: 06/16-17/99

Received: 06/18/99

Extracted: 06/21/99

Tested: 06/21-24/99

Reported: 06/29/99

Sample Description: Soil and Water

Project Description: W-101 Bioremediation

Analysis of Water and Soil Samples

I. Analysis of Water Samples

Component Analyzed	Method	Unit	PQL	Analysis Result 99-04287-13
NITROAROMATICS AND NITROAMINES				
Dilution Factor				2.56
4-AMINO-2,6-DINITROTOLUENE	8330	µg/L	10	<26
2-AMINO-4,6-DINITROTOLUENE	8330	µg/L	10	<26
1,3-DINITROBENZENE	8330	µg/L	4	<10
2,4-DINITROTOLUENE	8330	µg/L	5.7	<15
2,6-DINITROTOLUENE	8330	µg/L	9.4	<24
HMX	8330	µg/L	13	<34
NITROBENZENE	8330	µg/L	6.4	<17
3-NITROTOLUENE	8330	µg/L	7.9	<21
RDX	8330	µg/L	14	<36
TETRYL	8330	µg/L	4	<10
1,3,5-TRINITROBENZENE	8330	µg/L	7.3	<19
2,4,6-TRINITROTOLUENE	8330	µg/L	6.0	<18
2-NITROTOLUENE (a)	8330	µg/L	8.5	<22
4-NITROTOLUENE (a)	8330	µg/L	8.5	<22

II. Analysis of Soil Samples

Component Analyzed	Method	Unit	PQL	Analysis Result 99-04287-1	Analysis Result 99-04287-2
MOISTURE, PERCENT IN SOIL	ASTM-D2216	%Moisture	0.5	1.9	2.8
NITROAROMATICS AND NITROAMINES					
Dilution Factor				1	1
4-AMINO-2,6-DINITROTOLUENE	8330	mg/kg	0.2	<0.20	<0.21
2-AMINO-4,6-DINITROTOLUENE	8330	mg/kg	0.2	0.42	0.11
1,3-DINITROBENZENE	8330	mg/kg	0.25	<0.25	<0.26
2,4-DINITROTOLUENE	8330	mg/kg	0.25	0.63	<0.26
2,6-DINITROTOLUENE	8330	mg/kg	0.25	<0.25	<0.26
HMX	8330	mg/kg	0.25	1.1	0.2J
NITROBENZENE	8330	mg/kg	0.25	<0.25	<0.26
3-NITROTOLUENE	8330	mg/kg	0.25	<0.25	<0.26
RDX	8330	mg/kg	0.25	2.1	0.48
TETRYL	8330	mg/kg	0.25	<0.25	<0.26
1,3,5-TRINITROBENZENE	8330	mg/kg	0.25	1.2	0.2J
2,4,6-TRINITROTOLUENE	8330	mg/kg	0.25	1.9	2.8
2-NITROTOLUENE (a)	8330	mg/kg	0.25	<0.25	<0.26
4-NITROTOLUENE (a)	8330	mg/kg	0.25	<0.25	<0.26

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APCL Analytical Report

Component Analyzed	Method	Unit	PQL	Analysis Result	
				99-04287-3	99-04287-4
MOISTURE, PERCENT IN SOIL	ASTM-D2216	%Moisture	0.5	3.8	21.2
NITROAROMATICS AND NITROAMINES					
Dilution Factor				1	10
4-AMINO-2,6-DINITROTOLUENE	8330	mg/kg	0.2	<0.21	10
2-AMINO-4,6-DINITROTOLUENE	8330	mg/kg	0.2	0.23	3
1,3-DINITROBENZENE	8330	mg/kg	0.25	<0.28	<3.2
2,4-DINITROTOLUENE	8330	mg/kg	0.25	<0.38	<3.2
2,6-DINITROTOLUENE	8330	mg/kg	0.25	<0.26	<3.2
HMX	8330	mg/kg	0.25	4.7	27
NITROBENZENE	8330	mg/kg	0.25	0.32	<3.2
1-NITROTOLUENE	8330	mg/kg	0.25	<0.28	<3.2
RDX	8330	mg/kg	0.25	22.9	187
TETRYL	8330	mg/kg	0.25	<0.28	<3.2
1,3,5-TRINITROBENZENE	8330	mg/kg	0.25	8.94	6.3
2,4,6-TRINITROTOLUENE	8330	mg/kg	0.25	16.8	28
2-NITROTOLUENE (a)	8330	mg/kg	0.25	<0.38	<3.2
4-NITROTOLUENE (a)	8330	mg/kg	0.25	<0.26	<3.2

Component Analyzed	Method	Unit	PQL	Analysis Result	
				99-04287-5	99-04287-6
MOISTURE, PERCENT IN SOIL	ASTM-D2215	%Moisture	0.5	24.4	20.3
NITROAROMATICS AND NITROAMINES					
Dilution Factor				10	10
4-AMINO-2,6-DINITROTOLUENE	8330	mg/kg	0.2	12	7.1
2-AMINO-4,6-DINITROTOLUENE	8330	mg/kg	0.2	8	23
1,3-DINITROBENZENE	8330	mg/kg	0.25	<3.3	<3.1
2,4-DINITROTOLUENE	8330	mg/kg	0.25	<3.3	<3.1
2,6-DINITROTOLUENE	8330	mg/kg	0.25	<3.3	<3.1
HMX	8330	mg/kg	0.25	25	12
NITROBENZENE	8330	mg/kg	0.25	<3.3	<3.1
1-NITROTOLUENE	8330	mg/kg	0.25	<3.3	<3.1
RDX	8330	mg/kg	0.25	176	84
TETRYL	8330	mg/kg	0.25	<3.3	<3.1
1,3,5-TRINITROBENZENE	8330	mg/kg	0.25	3.8	23
2,4,6-TRINITROTOLUENE	8330	mg/kg	0.25	20	12
2-NITROTOLUENE (a)	8330	mg/kg	0.25	<3.3	<3.1
4-NITROTOLUENE (a)	8330	mg/kg	0.25	<3.3	<3.1

Component Analyzed	Method	Unit	PQL	Analysis Result	
				99-04287-7	99-04287-8
MOISTURE, PERCENT IN SOIL	ASTM-D2216	%Moisture	0.5	27.6	17.8

Appendix E



B11a, View into pit B.



B11a, View of pit from the southwest SWMU corner.
SWMU 11a – December 1997



SWMU 11a - September 1999